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24239 7590 01/29/2010 MOORE & VAN ALLEN PLLC P.O. BOX 13706 Research Triangle Park, NC 27709			EXAMINER WEBB, GREGORY E	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/581,475	Applicant(s) BERNHARD ET AL.	
	Examiner Gregory E. Webb	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) 18-43 and 45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 11/9/2009 have been fully considered but they are not persuasive.
2. The applicant argues the restriction is in error as the composition in claim 1 is the same composition used in the method of claim 18.
3. The examiner maintains that the limitations of these two claims would required two separate searches and would thus be a burden on the examiner. Claim 18 requires several features which would be given different weight in the composition claim. For example, the substrate, the contaminant and the gap fill material are all apart of the intended use of the composition and not directly related to the composition. In composition claims the intended use is given little weight. As these features require greater attention in method claims, such claims would require a separate and distinct search. Thus the restriction is maintained.

Claim Rejections - 35 USC § 112

4. Claims 13 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. In claim 13 the applicant has used various trade names to further limit the parent claim. Although these surfactants may be known at the time of filing, trade names are subject to change over time and are not considered definite. As the manufacturer can freely and at any time change the composition of these materials they are not

Art Unit: 1796

considered definite or limiting. It is suggested the applicant determine the chemical names of these trade marked compositions.

6. In claim 45 the applicant has duplicated the last compound of the Markush group. For clarity this duplication should be removed.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Art Unit: 1796

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

8. Claims 1-17 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Wojtczak, William A. et al. US 20030078173 A1.

Concerning the organic amine, fluoride, ammonium fluoride, chelating agent, and preferred fluoride, Wojtczak, William A. teaches the following:

[0097] The formulations of the invention may include a wide variety of **organic amines**, substituted **ammonium fluorides**, and nitrogen-containing carboxylic acids, other than those specifically exemplified. Particular substituted **ammonium fluorides** of suitable character include those of the general formula, $R_{1R_{2R_{3R_{4N}}F}$ in which each of the respective R species is independently selected from hydrogen and aliphatic groups. Suitable nitrogen-containing carboxylic acids include those of the general structure $COOH-CH_2-NRR'$, wherein R and R' are each independently selected from the group consisting of hydrogen, alkyl, aryl, and carboxylic acid moieties. Suitable metal **chelating agents** include 1,3-dicarbonyl compounds of the general structure $X-CH_2R-CH_2Y$. In compounds of such formula, R is either a hydrogen atom or an aliphatic group, e.g., C_1-C_8 alkyl, aryl, alkenyl, etc. X and Y may be the same as or different from one another, and are functional groups containing multiply-bonded moieties with electron-withdrawing properties, as for example $CONH_2$, $CONHR'$,

Art Unit: 1796

CN, NO.sub.2, SOR', or SO.sub.2Z, in which R' represents a C.sub.1-C.sub.8 alkyl group and Z represents another atom or group, e.g., hydrogen, halo or C.sub.1-C.sub.8 alky.

Wojtczak teaches various examples in paragraph 167 including those that contain ammonium fluoride, amines such as triethanolamine and water.

Concerning the chelating agent, the claimed organic solvent and the specific organic amines, Wojtczak, William A. teaches the following:

51. The method of claim 43, wherein said **fluoride** source is selected from the group consisting of: any combination of ammonia gas or ammonium hydroxide and **hydrogen fluoride** gas or **hydrofluoric acid**, **ammonium fluoride**, **ammonium bifluoride**, triethanol**ammonium fluoride** (TEAF), diglycol**ammonium fluoride** (DGAF), methyldiethanol**ammonium fluoride** (MDEAF), **tetramethylammonium fluoride** (TMAF), and **triethylamine tris(hydrogen fluoride)** (TREAT-HF); said **organic amine** is chosen from the group consisting of: **diglycolamine (DGA)**, **methyldiethanolamine (MDEA)**, **pentamethyldiethylenetriamine (PMDETA)**, **triethanolamine (TEA)**, **triethylenediamine (TEDA)**, **hexamethylenetetramine**, **3,3-iminobis(N,N-dimethylpropylamine)**, **monoethanolamine**, **2-(methylamino)ethanol**, **4-(2-hydroxyethyl)morpholine**, **4-(3-aminopropyl)morpholine**, and **N,N-dimethyl-2-(2-aminoethoxy)ethanol**; said nitrogen-containing carboxylic acid or imine is chosen from

Art Unit: 1796

the group consisting of: **iminodiacetic acid (IDA)**, **glycine**, **nitrilotriacetic acid (NTA)**, hydroxyethyliminodiacetic acid, 1,1,3,-tetramethylguanidine (TMG), ethylenediaminetetracetic acid (EDTA), $\text{CH.sub.3C(.dbd.NCH.sub.2CH.sub.2OH)CH.sub.2C(O)N(CH.sub.3).sub.2}$, $\text{CH.sub.3C(.dbd.NCH.sub.2CH.sub.2OCH.sub.2CH.sub.2OH)CH.sub.2C(O)N(CH.sub.3).sub.2}$, $\text{CH.sub.3C(.dbd.NH)CH.sub.2C(O)CH.sub.3}$, $\text{(CH.sub.3CH.sub.2).sub.2NC(.dbd.NH)N(CH.sub.3CH.sub.2).sub.2}$, $\text{HOOCCH.sub.2N(CH.sub.3).sub.2}$, and $\text{HOOCCH.sub.2N(CH.sub.3)CH.sub.2COOH}$; and said metal **chelating agent** is selected from the group consisting of:

acetoacetamide; ammonium carbamate; ammonium pyrrolidinedithiocarbamate (APDC); dimethyl malonate; methyl acetoacetate; N-methyl acetoacetamide; 2,4-pentanedione; 1,1,1,5,5,5-hexafluoro-2,4-pentanedione H(hfac); 2,2,6,6-tetramethyl-3,5-heptanedione H(thd); tetramethylammonium thiobenzoate; tetramethylammonium trifluoroacetate; tetramethylthiuram disulfide (TMTDS); **lactic acid**; **ammonium lactate**; malonic acid formic acid, acetic acid, propionic acid, gamma-butyrolactone, methyldiethanolammonium trifluoroacetate, and trifluoroacetic acid.

Concerning the surfactant, Wojtczak, William A. teaches the following:

[0091] The combination of ammonium fluoride or a substituted fluoride source, as described above, with an amine (other than an amine present as a **surfactant** in an amount of 1% or less) provides better stripping performance with less corrosivity than formulations containing either ammonium fluoride or amines alone. In addition, the

Art Unit: 1796

resulting alkaline solutions are effective at lower processing temperatures (e.g., 21.degree.-40.degree. C.) than conventional amine-containing formulations.

9. Claims 1-17 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Wojtczak, William A. et al. US 20010050350 A1.

Concerning the claimed organic solvent, the organic amine and the chelating agent, Wojtczak, William A. teaches the following:

[0087] Formulations that have been found to be effective in cleaning residue and slurry particles from metal surfaces typically have pH values between about 7 and about 9. These formulations generally are aqueous solutions that comprise a **fluoride** source, an **organic amine**, and metal **chelating agent**. The individual constituents typically constitute a **fluoride** source and/or a derivative thereof as about 0.1 to about 4.2% of the formulation. The **fluoride** source may include Ammonium Fluoride, Triethanolammonium Fluoride (TEAF), Diglycolammonium Fluoride (**DGAF**), Tetramethylammonium Fluoride (TMAF), Ammonium Bi**fluoride** or other such **fluoride** sources as known to those skilled in the art. The organic Amine or mixture of two amines typically comprises between about 2% and about 11% of the formulation of the present invention, wherein the **organic amine** can be one of many such **organic amines known to those skilled in the art including Methyldiethanolamine**,

Art Unit: 1796

Pentamethyldiethylenediamine (PMDETA), Triethanolamine (TEA), Monoethanolamine, and Diglycolamine. The metal **chelating agent** or mixture of **chelating agents** typically comprises about 0 to about 4.2% of the formulation. Typical metal **chelating agent** include: **iminodiacetic acid**, 2,4-pentanedione, methyldiethanolammonium trifluoroacetate, ammonium carbamate, ammonium pyrrolidinedithiocarbamate-, **ammonium lactate**, malonic acid or other similar agents as known to those skilled in the art.

Concerning the organic amine, fluoride, ammonium fluoride, chelating agent, and preferred fluoride, Wojtczak, William A. teaches the following:

[0076] The formulations of the invention may include a wide variety of **organic amines**, substituted **ammonium fluorides**, and nitrogen-containing carboxylic acids, other than those specifically exemplified. Particular substituted **ammonium fluorides** of suitable character include those of the general formula, $R_{.1}R_{.2}R_{.3}R_{.4}NF$ in which each of the respective R species is independently selected from hydrogen and aliphatic groups. Suitable nitrogen-containing carboxylic acids include those of the general structure $COOH-CH_{.2}-NRR'$, wherein R and R' are each independently selected from the group consisting of hydrogen, alkyl, aryl, and carboxylic acid moieties. Suitable metal **chelating agents** include 1,3-dicarbonyl compounds of the general structure $X-CHR-Y$. In compounds of such formula, R is either a hydrogen atom or an aliphatic group, e.g., $C_{.1}-C_{.8}$ alkyl, aryl, alkenyl, etc. X and Y may be the same

Art Unit: 1796

as or different from one another, and are functional groups containing multiply-bonded moieties with electron-withdrawing properties, as for example CONH_2 , CONHR' , CN , NO_2 , SOR' , or SO_2Z , in which R' represents a $\text{C}_1\text{-C}_8$ alkyl group and Z represents another atom or group, e.g., hydrogen, halo or $\text{C}_1\text{-C}_8$ alkyl.

Concerning the surfactant, Wojtczak, William A. teaches the following:

[0070] The combination of ammonium fluoride or a substituted fluoride source, as described above, with an amine (other than an amine present as a **surfactant** in an amount of 1% or less) provides better stripping performance with less corrosivity than formulations containing either ammonium fluoride or amines alone. In addition, the resulting alkaline solutions are effective at lower processing temperatures (e.g., 21°C .- 40°C .) than conventional amine-containing formulations.

10. Claims 1-17 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Seijo, Ma. Fatima et al. US 20030181342 A1.

Concerning the organic amine, fluoride, ammonium fluoride, and preferred fluoride, Seijo, Ma. Fatima teaches the following:

Art Unit: 1796

23. The semi-aqueous cleaning formulation of claim 19, wherein said **fluoride** source is selected from the group consisting of: **ammonium fluoride**; **ammonium bifluoride**; **tetraalkylammonium fluorides**, wherein each alkyl group may be same or different and is selected from the group consisting of C.sub.1 to C.sub.4, such as **tetramethylammonium fluoride** (TMAF); and **amine fluoride salts, such as, methyldiethanolammonium fluoride (MDEAF); triethanolammonium fluoride (TEAF); diglycolammonium fluoride (DGAF); and triethylamine tris (hydrogen fluoride) (TREAT-HF).**

Concerning the preferred chelating agent, Seijo, Ma. Fatima teaches the following:

29. The semi-aqueous cleaning formulation of claim 25, wherein said cleaning agent is a carboxylic acid selected from the group consisting of: **glycine**, oxalic acid, malonic acid, succinic acid, **citric acid**, **tartaric acid**, **gluconic acid**, **nitrilotriacetic acid**, their salts and mixtures thereof.

Concerning the claimed additional amine, Seijo, Ma. Fatima teaches the following:

12. The semi-aqueous cleaning formulation of claim 1, wherein said buffering system comprises a conjugate base selected from the group consisting of: ammonia, tetramethylammonium hydroxide, tetraalkylammonium hydroxide, **2-**

Art Unit: 1796

(methylamino)ethanol, monoisopropanolamine, diglycolamine, N,N-dimethyl-2-(2-aminoethoxy)ethanol, 1-(2-aminoethyl)piperidine, 1-(2-hydroxyethyl)piperazine, 1-(2-aminoethyl)piperazine, 1-(3-aminopropyl)imidazole, 1,8-diazabicyclo[5.4.0]undec-7-ene, N.N.N'-trimethylaminoethanolamine, pentamethyldiethylenetriamine, ethylmorpholine, hydroxyethylmorpholine, aminopropylmorpholine, triethanolamine, and methyldiethanolamine.

Concerning the claimed organic solvent, Seijo, Ma. Fatima teaches the following:

[0045] In a further embodiment, the present invention relates to a semi-aqueous cleaning formulation useful for removing particles from a semiconductor substrate, wherein said formulation comprises a buffer system, and optionally, a **fluoride** source and an organic solvent system. Preferably, the organic solvent system is soluble in water. Preferably the organic solvent system comprises at least one polar solvent component. The cleaning formulation may comprise from about 0-95% weight by volume of the solvent system, more preferably between 0 and 80% weight by volume and most preferably between 0 and 70% weight by volume of the organic solvent system. Preferably, at least one component of the organic solvent system comprises an amide or ether functional group. Preferred solvents include but are not limited **formamides amide glycol ethers, to N,N-dimethylacetamide, N,N-dimethylformamide, 1-cyclohexyl-2-pyrrolidinon- e, N-methylpyrrolidone, N-**

Art Unit: 1796

cyclohexylpyrrolidone, N-hydroxyethylpyrrolidone- , N-octylpyrrolidone, 1,3-dimethylpiperidone, ethylene glycol, propylene glycol, phenoxyethanol, sulfolane, gamabutyrolactone, butyrolactone, 1,4-butanediol, N,N-dimethylacetoacetamide, N-cyclohexylpyrrolidone, N-octylpyrrolidone, 1-phenoxy-2-propanol, phenoxyethanol, dimethylsulfoxide, diethyleneglycol monobutylether, diethyleneglycol monomethylether, diethylene glycol monoethylether, diethylene glycol monopropyl ether, 1,3-dimethyl-2-imidazolidinone and mixtures thereof.

11. Claims 1-17 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Small, Robert J. et al. US 20020037820 A1.

Concerning the fluoride, the organic solvent, the surfactant, and chelating agent, Small, Robert J. teaches the following:

[0033] A composition in accordance with this invention is for photoresist stripping and comprises from about 0.01 percent by weight to about 10 percent by weight of one or more **fluoride compounds**, an effective amount of up to about 95 percent by weight of one or more solvents that are sulfoxides or sulfones, and at least about 20 percent by weight water. Additionally, the composition may optionally contain basic amines, co-solvents, corrosion inhibitors, **chelating agents, surfactants**, acids and bases. A preferred embodiment contains ammonium **hydrogen fluoride, DMSO**, and water.

Art Unit: 1796

Concerning the claimed organic solvent, Small, Robert J. teaches the following:

7. The composition of claim 1 wherein said composition comprises about 3.5% by weight of **ammonium fluoride**, about 65.5% by weight **dimethylsulfoxide**, about 28.5% water, and about 2.5% 2-amino 2-ethoxyethanol.

Concerning the organic amine, fluoride, ammonium fluoride, and preferred fluoride, Small, Robert J. teaches the following:

[0075] In addition to the benefits of using ammonium **hydrogen fluoride**, as described above, it has been found that the addition of a basic amine compound, such as **2-amino-2-ethoxy ethanol** and the like, to a aqueous formulation containing a **fluoride compound** and an organic sulfoxide and/or sulfone solvent effectively neutralizes the HF by forming a quaternary **ammonium fluoride** salt, for example, according to the following reactions:

Concerning the claimed additional amine, Small, Robert J. teaches the following:

[0037] Another preferred composition for cleaning and stripping consists of ammonium **hydrogen fluoride**, **DMSO**, water, and a basic amine selected from the group consisting of **hydroxylamine**, hydrazine, **2-amino-2-ethoxy ethanol**,

Art Unit: 1796

monoethanolamine, diethylhydroxylamine, choline, tetramethylammonium formate, **monoisopropanolamine, diethanolamine**, and **triethanolamine**.

12. Claims 1-17 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Ikemoto, Kazuto et al. US 20040029753 A1.

Concerning the fluoride, ammonium fluoride, and preferred fluoride, Ikemoto, Kazuto teaches the following:

5. The resist stripping liquid according to claim 1, wherein the fluorine compound is **ammonium fluoride**, acid **ammonium fluoride** or **hydrofluoric acid**.

Concerning the chelating agent, Ikemoto, Kazuto teaches the following:

[0017] Examples of the corrosion inhibitor for copper include azoles such as **benzotriazole**; alkyne compounds such as acetylene alcohol; and lower-valent sulfur compounds such as thiourea and mercaptothiazole. In the low dissolved oxygen conditions specified in the present invention, these compounds can exhibit their corrosion-inhibiting effect at low concentrations. In addition, the low dissolved oxygen conditions of the present invention enable the use of compounds having low corrosion-inhibiting effects.

Concerning the organic amine, claimed additional amine, propylene glycol monomethyl ether, and claimed organic solvent, Ikemoto, Kazuto teaches the following:

4. The resist stripping liquid according to claim 3, wherein the solvent is at least one compound selected from the group consisting of ethylene glycol monoethyl ether, ethylene glycol monobutyl ether, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, diethylene glycol monobutyl ether, triethylene glycol, triethylene glycol monomethyl ether, triethylene glycol monoethyl ether, triethylene glycol monopropyl ether, triethylene glycol monobutyl ether, triethylene glycol dimethyl ether, **propylene glycol monomethyl ether**, propylene glycol monoethyl ether, propylene glycol monobutyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monoethyl ether, dipropylene glycol monobutyl ether, diethylene glycol dimethyl ether, dipropylene glycol dimethyl ether, formamide, monomethylformamide, dimethylformamide, monoethylformamide, diethylformamide, acetamide, monomethylacetamide, dimethylacetamide, monoethylacetamide, diethylacetamide, **N-methylpyrrolidone**, N-ethylpyrrolidone, N-methylcaprolactam, methyl alcohol, ethyl alcohol, isopropanol, **ethylene glycol**, **propylene glycol**, **dimethyl sulfoxide**, dimethylsulfone, diethyl sulfone, bis(2-hydroxyethyl) sulfone, tetramethylene sulfone, 1,3-dimethyl-2-imidazolidinone, 1,3-diethyl-2-imidazolidinone, 1,3-diisopropyl-2-imidazolidinone, .gamma.-butyrolactone, .delta.-valerolactone, **aminoethanol**, **diethanolamine**, **triethanolamine**, **isopropanolamine**, **1-amino-3-propanol**, **diisopropanolamine**,

Art Unit: 1796

triisopropanolamine, dimethylaminoethanol, N-methylaminoethanol, diethylaminoethanol, aminoethoxyethanol, ethylenediamine, diethylenetriamine, triethylenetetramine, and tetraethylenepentamine

Concerning the surfactant, Ikemoto, Kazuto teaches the following:

[0016] The resist stripping liquid of the present invention may further contain a corrosion inhibitor or a **surfactant**.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1796

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/Gregory E. Webb/
Primary Examiner, Art Unit 1796

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